Amendments to the Claims

Please cancel claim 589 without prejudice.

The following listing of claims will replace all prior versions and/or listings of claims in the application:

Listing of Claims:

1-582. (cancelled)

583. (currently amended): A heater, comprising:

an electrical conductor configured to generate an electrically resistive heat output during application of AC to the electrical conductor, wherein the electrical conductor comprises an electrically resistive ferromagnetic material at least partially surrounding a non-ferromagnetic material such that the heater provides a reduced amount of heat above or near a selected temperature;

a conduit at least partially surrounding the electrical conductor; ~~and~~

a centralizer configured to maintain a separation distance between the electrical conductor and the conduit; and

wherein the heater is configured to be placed in an opening in a subsurface formation.

584. (original): The heater of claim 583, wherein the electrical conductor is formed by a coextrusion process that combines the ferromagnetic material and the non-ferromagnetic material.

585. (original): The heater of claim 583, wherein the centralizer comprises silicon nitride.

586. (original): The heater of claim 583, wherein the conduit comprises electrically conductive material.

587. (original): The heater of claim 583, wherein the heater comprises one or more portions coupled together, wherein each portion comprises at least one section of the electrical conductor, and wherein at least one section of the electrical conductor has been coupled to at least another section of the electrical conductor using a weld.

588. (currently amended): The heater of claim 583, wherein the heater is configured to allow heat to transfer from the heater to a part of ~~a~~ the subsurface formation to pyrolyze at least some hydrocarbons in the subsurface formation.

589. (cancelled)

590. (original): The heater of claim 583, wherein a resistance of the ferromagnetic material decreases above the selected temperature such that the heater provides the reduced amount of heat above the selected temperature.

591. (original): The heater of claim 583, further comprising a second ferromagnetic material coupled to the ferromagnetic material.

592. (original): The heater of claim 583, wherein the selected temperature is approximately the Curie temperature of the ferromagnetic material.

593. (original): The heater of claim 583, wherein the ferromagnetic material comprises iron.

594. (original): The heater of claim 583, wherein the reduced amount of heat is less than about 400 watts per meter of length of the heater.

595. (original): The heater of claim 583, wherein the heat output below the selected temperature is greater than about 400 watts per meter of length of the heater.

596. (original): The heater of claim 583, wherein the heater comprises a relatively flat AC resistance profile in a temperature range between about 100 °C and 750 °C.

597. (original): The heater of claim 583, wherein at least a portion of the heater is longer than about 10 m.

598. (currently amended): The heater of claim 583, wherein the ~~ferromagnetic material~~heater comprises a turndown ratio of at least about 2 to 1.

599. (original): The heater of claim 583, wherein the non-ferromagnetic material comprises copper.

600. (original): A method of heating a subsurface formation, comprising:

providing AC to an electrical conductor to provide an electrically resistive heat output, wherein the electrical conductor comprises an electrically resistive ferromagnetic material at least partially surrounding a non-ferromagnetic material such that the electrical conductor provides a reduced amount of heat above or near a selected temperature, wherein a conduit at least partially surrounds the electrical conductor, and wherein a centralizer maintains a separation distance between the electrical conductor and the conduit; and

allowing heat to transfer from the electrical conductor to at least part of the subsurface formation.

601. (original): The method of claim 600, wherein the AC provided to the electrical conductor has a frequency between about 100 Hz and about 1000 Hz.

602. (original): The method of claim 600, wherein the reduced amount of heat is provided without adjusting the amperage of the AC applied to the electrical conductor.

603. (original): The method of claim 600, further comprising providing an initial electrically resistive heat output when the electrical conductor providing the heat output is at least about 50

°C below the selected temperature, and automatically providing the reduced amount of heat above or near the selected temperature.

604. (original): The method of claim 600, further comprising placing the electrical conductor in a wellbore in the subsurface formation.

605. (original): The method of claim 600, wherein heat output from the electrical conductor is substantially constant when a temperature of the electrical conductor is between about 100 °C and 750 °C.

606. (original): The method of claim 600, wherein an AC resistance of the electrical conductor decreases above the selected temperature to provide the reduced amount of heat.

607. (original): The method of claim 600, wherein a thickness of the ferromagnetic material is at least about 3/4 of a skin depth of the AC at the Curie temperature of the ferromagnetic material.

608. (original): The method of claim 600, further comprising providing a reduced amount of heat above or near the selected temperature of less than about 400 watts per meter of length of the electrical conductor.

609. (original): The method of claim 600, further comprising controlling a skin depth in the electrical conductor by controlling a frequency of the AC applied to the electrical conductor.

610. (original): The method of claim 600, further comprising controlling the heat applied from the electrical conductor by allowing less heat to be applied from any part of the electrical conductor that is at or near the selected temperature.

611. (original): The method of claim 600, further comprising applying current of at least about 70 amps to the electrical conductor.

612. (original): A heater, comprising:

an electrical conductor configured to generate an electrically resistive heat output when AC is applied to the electrical conductor, wherein the electrical conductor comprises an electrically resistive ferromagnetic material at least partially surrounding a non-ferromagnetic material, and wherein the ferromagnetic material is configured to provide a reduced amount of heat above or near a selected temperature that is about 20% or less of the heat output at about 50 °C below the selected temperature;

a conduit at least partially surrounding the electrical conductor; and

a centralizer configured to maintain a separation distance between the electrical conductor and the conduit.

613. (original): The heater of claim 612, wherein the centralizer comprises silicon nitride.

614. (original): The heater of claim 612, wherein the heater comprises one or more portions coupled together, wherein each portion comprises at least one section of the electrical conductor, and wherein at least one section of the electrical conductor has been coupled to at least another section of the electrical conductor using a weld.

615. (original): The heater of claim 612, wherein a resistance of the ferromagnetic material decreases above the selected temperature such that the heater provides the reduced amount of heat above the selected temperature.

616. (original): The heater of claim 612, further comprising a second ferromagnetic material coupled to the ferromagnetic material.

617. (original): The heater of claim 612, wherein the selected temperature is approximately the Curie temperature of the ferromagnetic material.

618. (original): The heater of claim 612, wherein the ferromagnetic material comprises iron.

619. (original): The heater of claim 612, wherein the reduced amount of heat is less than about 400 watts per meter of length of the heater.

620. (original): The heater of claim 612, wherein the heat output below the selected temperature is greater than about 400 watts per meter of length of the heater.

621. (original): The heater of claim 612, wherein the heater comprises a relatively flat AC resistance profile in a temperature range between about 100 °C and 750 °C.

622. (original): The heater of claim 612, wherein at least a portion of the heater is longer than about 10 m.

623. (currently amended): The heater of claim 612, wherein the ~~ferromagnetic material~~heater comprises a turndown ratio of at least about 2 to 1.

624. (original): The heater of claim 612, wherein the non-ferromagnetic material comprises copper.

625-1690. (cancelled)

1691. (new): A heater, comprising:

an electrical conductor configured to generate an electrically resistive heat output during application of AC to the electrical conductor, wherein the electrical conductor comprises an electrically resistive ferromagnetic material at least partially surrounding a non-ferromagnetic material such that the heater provides a reduced amount of heat above or near a selected temperature;

a conduit at least partially surrounding the electrical conductor;

a centralizer configured to maintain a separation distance between the electrical conductor and the conduit; and

wherein the heater comprise a turndown ratio of at least about 2 to 1.

1692. (new): The heater of claim 1691, wherein the conduit comprises electrically conductive material.

1693. (new): The heater of claim 1691, wherein the selected temperature is approximately the Curie temperature of the ferromagnetic material.

1694. (new): The heater of claim 1691, wherein the ferromagnetic material comprises iron.

1695. (new): The heater of claim 1691, wherein the non-ferromagnetic material comprises copper.